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CHELONIA DEPRESSA GARMAN RE-INVESTIGATED

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The pantropical sea turtle genus *Chelonia* is characterized by the tendency to mass at restricted breeding places — islands or bits of shore — where copulation as well as nesting takes place. Desultory nesting by females going separately ashore occurs in intervening regions, but by far the greater part of the reproduction of the genus takes place in aggregations. Results of extensive recent tagging studies have revealed that members of a nesting assemblage may converge from several different year-around feeding grounds, some of which may lie as far as a thousand miles away. This site tenacity in breeding is so strong that one wonders how new nesting colonies are ever established. The genus may therefore be strongly fragmented genetically, and nascent species, or even quite genuine species, may currently be confused under the collective name *Chelonia mydas*. The surprising thing is that this isolation has produced so little well-marked morphologic divergence. One example of the degree of differentiation that occurs is shown by Carr and Hirth (1962), but material representing the numerous isolated breeding populations of the genus is still too meagre to support an extensive revision of the group. One local population, however, is morphologically so distinct that it may be tentatively regarded as a species, even though only about 40 specimens are at present known to have been preserved in museums. This sharply distinguished taxon is *Chelonia depressa* Garman, described in 1880.

The type of *C. depressa* is a mounted adult male in the Museum of Comparative Zoology (MCZ 4473), with the locality "North Australia." It is a flat-shelled turtle with short flippers, and with

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only three postoculars on either side. The squamation of both fore and hind limbs is notably weak. In superficial appearance this could be equally well a freakish specimen of *Chelonia mydas* or some sort of *Lepidochelys*.

The type is still one of the few adults known. However, our own examination of the type and of hatchlings and young turtles from the vicinity of the type locality and data generously provided for specimens in Australian museums (see Table 1) leave little doubt that there exists a distinct north and northeast Australian population of *Chelonia*, clearly differentiated from other known forms of the genus, for which the name *depressa* is available.

Boulenger in 1889 placed *C. depressa* in the synonymy of *C. mydas*, although he had one juvenile specimen of the Garman species at hand, in the British Museum collections. A year later, believing that Boulenger was in error, Baur proposed elevating *depressa* to generic rank on the basis of trivial features of the lower jaw seen in the type. Baur's opinion was generally ignored, and *C. mydas* and *C. depressa* have almost universally continued to be regarded as conspecific. Probably the principal reason for the rejection of Garman's species by the majority of herpetologists has been the absence from most institutions of any material of the form. Even the careful re-appraisal of the characters of *depressa* by D. B. Fry in 1913, on the basis of seven specimens from northern Australia and adjacent New Guinea waters, did not carry the day. The issue may have been somewhat clouded by McCulloch's (1908) attempt to erect a new genus and species (*Natator tessellatus*) for a specimen which Fry was able to show was clearly identical with *depressa*. However, it was also unfortunate that Fry, after providing a superlative case for the distinctness of *depressa* on the basis of external characters, went on to place emphasis on certain skull characters (he had only one subadult skull of *depressa*) which are subject to considerable individual variation. Skepticism was only reinforced when Barbour (1914) revealed that Garman's own original series was composite and that the young specimen (MCZ 1413) was a typical *mydas* according to Fry's newly provided characters.

The down-grading of Fry's study — much more than the neglect of Garman's inadequate description — was truly unfortunate. More than 50 years later we can add no new really useful characters to those offered by Fry. Most of Fry's characters are indeed subject to some individual variation and others are difficult to state objectively, but in aggregate they — at least those based on externals — build a clear diagnosis of *depressa* and suggest that

it may be the most trenchantly differentiated local population of any of the five sea turtle genera anywhere in the world.

We have checked 15 characters in the material examined. We list these characters below, with the condition characteristic of *depressa* in parenthesis in each case.

1. Shape of the carapace (oval in *depressa*).
2. Contact of first vertebral and first marginal (rarely present in *depressa*).
3. Postanal plastral scutes (frequent in *depressa*).
4. Brachial plates (often absent in *depressa*).
5. Shields between first inframarginals and humeral (one only in *depressa*).
6. Relative length of pastral plates (femoral longest in *depressa*).
7. Size of forelimb (short in *depressa*).
8. Scales of forelimb (wrinkled skin overlying phalanges in *depressa*).
9. Scales of hind limb (wrinkled skin overlying phalanges in *depressa*).
10. Number of postoculars (3 in *depressa*).
11. Prefrontal length relative to supraocular (equal or less in *depressa*).
12. Contact of prefrontal and maxillary sheath (no or very limited contact in *depressa*).
13. Number of postparietals (1 or 3 in *depressa*, not symmetrically divided).
14. Upper eyelid scales (scales uniformly small in *depressa*).
15. Number of scales posterior to postoculars (subtemporals) (numerous in *depressa*).

Each of these characters is of some use for the recognition of *depressa* but most are *not* key characters. It is clear from the statement of some of them that there is individual variability (e.g. marginal vertebral contact, postanals). Others, such as the shape of the carapace or the size of the forelimbs, are relatively difficult to make objective since allometry will modify the condition at various sizes. Still others (e.g. upper eyelid scales) are obvious when comparative material is available but in the absence of readily repeatable counts are sometimes equivocal.

Two characters *in combination*, however, do appear absolutely and unequivocally to define *depressa* as against other Green Turtles anywhere. These are the postocular scale count of 3, *plus* the areas of wrinkled skin distally on fore and hind limbs. In

reality, the last character may be sufficient, since we know of no overlap or approach in this feature at all.

There is, unhappily, rare overlap in the postocular count, although this also is usually diagnostic. All known *depressa* have 3 postoculars. In all other populations sampled by us and in material available in the British Museum, the Museum of Comparative Zoology, the United States National Museum, and the American Museum of Natural History a count of 3 postoculars on each side, without evidence of aberrant fusion with other scales, is very rare indeed, almost inconsequential (but see below). The extreme infrequency of 3 postoculars in non-*depressa* populations is shown with great clarity in Table 2, in which counts from 3,000 specimens from one East Pacific and two Atlantic localities are given; at least one other aberrant count in the table is a more frequent variation than the 3-3 count. Only one British Museum specimen, one from the Great Barrier Reef, is equivocal in these two crucial characters. It has postocular counts of 3-4 and counts across the forelimb of 6-7. It seems, however, on most characters to be *mydas*, and the three other members of the small series collected at the same time are unquestionable *mydas*, though one other has a 3-3 postocular count. (One Museum of Comparative Zoology specimen [MCZ 9471] from Murray Id., Torres Strait, likewise has a 3-3 postocular count.)

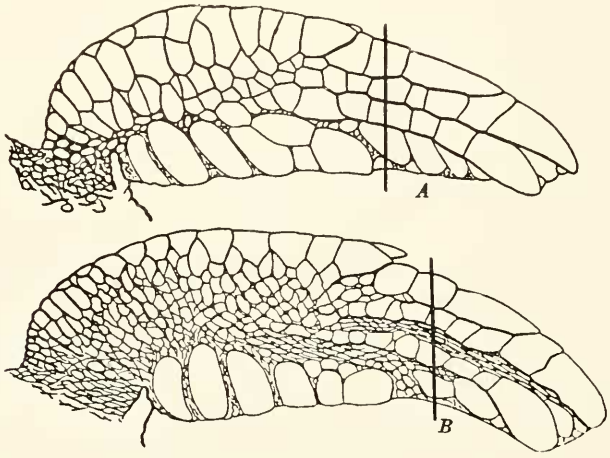

Figure 1. Forelimbs of *Chelonia mydas* (A) and *Chelonia depressa* (B) compared to show suggested places for counting scales across limb. (Modified from Fry, 1913.)

The disturbing element here is not the occasional overlap in characters but that the overlap occurs in the relatively small sample we have from the known range of *depressa*. The dearth of information on the distribution of breeding grounds of *Chelonia* in Australia makes it difficult to judge whether, and to what degree, *depressa* and *mydas* may nest sympatrically. There is an important nesting colony of *mydas*-like turtles on Capricorn Reef at the southern end of the Great Barrier Reef — especially on Heron Island and Northwest Island, at 23°30′S (Moorhouse, 1933). The islands of Torres Strait are, or used to be, heavily used for nesting by one or more forms of *Chelonia*, and Stokes (1846) reported abundant nesting both in the Gulf of Carpentaria and at Baron Island on the western Australian coast, at 20°45′S, 115°30′ W. In none of these cases is it known whether the turtle involved is *mydas* or *depressa*.[1]

The presence of the areas of wrinkled skin on the flippers of *depressa* is an even better method of diagnosing *depressa* than the three postoculars. The condition can clearly be shown in a comparative figure (such as Fry, 1913, fig. 46 a and b, and our photographs). However, a simple count will solve the problems of those who may feel, in the absence of actual comparative material, that they have an ambiguous or intermediate condition in front of them. A count of scales across the dorsal surface of the forelimb, two scales distal to the claw, will in *Chelonia mydas*

[1] Harold Cogger (Australian Museum) writes in a letter of March 9, 1967, "I'm afraid that I can give you little information re breeding sites of this species or of *C. mydas* along the north coast of Australia. *C. depressa* certainly breeds in many areas, and at the moment David Lindner, who collected our adult, currently has several *depressa* nests under observation at Port Essington. Despite frequent reports of *mydas* breeding in the area, we have no authentic records. As you know we have no specimens of *mydas* sympatric with our dozen or so specimens of *depressa*. I have written to David Lindner asking him to obtain all possible information on the occurrence of *mydas* in the area."

For the northeast coast of Australia — the other portion of the known range of *C. depressa* — J. T. Woods, Director of the Queensland Museum, reports sympatry between *C. mydas* and *C. depressa* over a stretch between Townsville and Heron Island (the latter approximately opposite Keppel Bay) but no overlapping records further north. Data that Mr. Woods has generously provided indicate that the eastern Queensland specimens of *C. mydas* adjacent to *C. depressa* localities are quite typical. However, since breeding range and residence range are for these turtles usually quite distinct, further information is much to be desired.

almost always be 4 or 5, while in *Chelonia depressa* the same count (*including always the small weak scales between the larger ones*) will be 7 to 10.

Most of the characters of *depressa* involve what appears to be a general weakening or reduction of the scalation. Besides the fewer postoculars, the lateral temporals and brachials are reduced in number, and the scales of the eyelid and forelimb are reduced in size. Series of specimens of *depressa* of several size groups will be required for final evaluation of certain of the other differentiating characters; for example, the broader and shorter fore flipper, the greater width of the head and the special texture of the areolar areas in the laminae of the hatchling.

A survey of the breeding and feeding range of *depressa* will reveal aspects of its ecology that will surely help clarify the status and relationships of the population. The short foreleg and broad skull, for example, if fully verified, may prove to be features of a carnivorous forager, like *Caretta* and *Lepidochelys* which poke about rocky places preying on crabs and mollusks, and hence do not make regular journeys between underwater pastures of turtle grass or algae and sleeping places and nesting beaches as typical populations of *Chelonia* do. That *depressa* may be a carnivorous *Chelonia* is also suggested by Fry's citing (1913:165) of the opinion of Hugh Christie that its meat is disagreeable in taste. However, it should be noted that Christie insisted that, "*C. depressa* is purely a vegetarian as far as my observations go. . . ." As Fry stated (1913, footnote, p. 165), the disagreeable taste may well have kept *depressa* out of turtle markets and thus out of the sight of zoologists. Green turtles with inferior eating qualities turn up in other places too, and these seem consistently to have a tendency to feed on invertebrates instead of plants. While the dietary divergence is, in other populations, not correlated with strong morphological differentiation, this may simply mean that *depressa*, with its putatively peculiar feeding regimen, has been isolated for a longer period of time than they. Studies of the feeding habitats and habits of *depressa* as well as of its sexual cycle and nesting ethology are needed; this work when done will greatly augment our understanding of a long neglected species.

ACKNOWLEDGMENTS

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TABLE 1

The known specimens of *Chelonia depressa*[1]

*1.	Type, MCZ 4473, "North Australia" — adult
*2.	BM 87-5.16.3, "N. W. Australia" — juvenile
*3.	FMNH 97086, Green Island near Cairns, Great Barrier Reef, Queensland, Australia — juvenile
*4.	MCZ 54713 = J 1111, Queensland Mus., no data — juvenile — not seen by Fry but the fourth Queensland Museum specimen cited by him
*5.	MCZ 54714 = J 3065, Queensland Mus., Cape Bowling Green, mid-East Queensland — juvenile
*6.	Type, *Natator tessellatus* — Port Darwin, Australian Mus. — Northern Territory, Australia = Fry specimen No. 6 — juvenile
*7.	Australian Mus. — Port Darwin, Northern Territory, Australia = Fry specimen No. 1 — juvenile
*8.	Australian Mus. — Torres Strait = Fry specimen No. 4 — juvenile
9.	Australian Mus. — Murray Island = Fry specimen No. 7, Torres Strait (skull removed, figured by Fry) — half grown
10-11-12.	Queensland Mus., J 184, J 185 (2), no data — not "New Guinea?" as stated by Fry = Fry specimens Nos. 2, 3, 5 — destroyed since Fry's time because of poor condition — juveniles
13-14.	Queensland Mus., J 1109, J 1110, Keppel Bay, mid-East Queensland — seen by Ogilby — "cannot be located in the present collections" — juveniles
15-16-17.	Queensland Mus., J 3066-68, Cape Bowling Green, mid-East Queensland — juveniles
18-19-20.	Queensland Mus., J 8551 (cast only), J 8575, J 8577, Thursday Island, Torres Strait — adult

*Specimens examined by E. E. Williams

[1] MCZ = Museum of Comparative Zoology; BM = British Museum (Natural History); FMNH = Field Museum of Natural History.

TABLE 1 (Cont.)

*21-30.	Australian Mus., R.8115-16, 8909-13, 9012, Sir Edward Pellew Group, Northern Territory — juveniles
*31.	Australian Mus., R.11756, Bathurst Island, Northern Territory — juveniles
*32.	Australian Mus., R.25691, Cape Don, Northern Territory — juvenile
33.	Western Australian Museum, R 773, Cape Don, Northern Territory — adult
*34-37.	Western Australian Museum, R 682-85, "N W Coast" — juveniles
*38-39.	Western Australian Museum, 10423-24, "from the Northwest" — juveniles
40.	Australian Mus., R.26347, Port Essington near Cape Don, Northern Territory — adult

TABLE 2

Frequency of postocular counts in *Chelonia mydas* from Tortuguero, Costa Rica; Ascension Island; and the Gulf of Baja California. In each pair of numbers heading the columns the first represents the left side and the second the right one.

	1-1	1-2	1-3	1½-2½	2-1	2-2	2-3	2½-3	2½-4	3-1	3-2	3-3	3-4	3-5	3½-4	4-2	4-3	4-4	4-5	4½-5	4-7	5-3	5-4	5-5	5-6	6-4
Tortuguero	2	2	2		3	3				1	5	77	70	3		2	88	409	85		1	1	118	65	2	1
Ascension Island													2					176					18			
Gulf of Baja California (data from Caldwell, 1962)				1		1	2	1	1		2	27	26	2	1		33	267	23	1			16			

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Figure 2. Distribution of *Chelonia depressa* in Australian waters.

Plate 1. *Chelonia depressa*, the British Museum hatchling. *Top:* dorsal view of head to show asymmetrical division of postparietal, and prefrontals equal in length to supraoculars. *Bottom:* dorsal view of body to show relative shortness of forelimbs and their weak scalation.

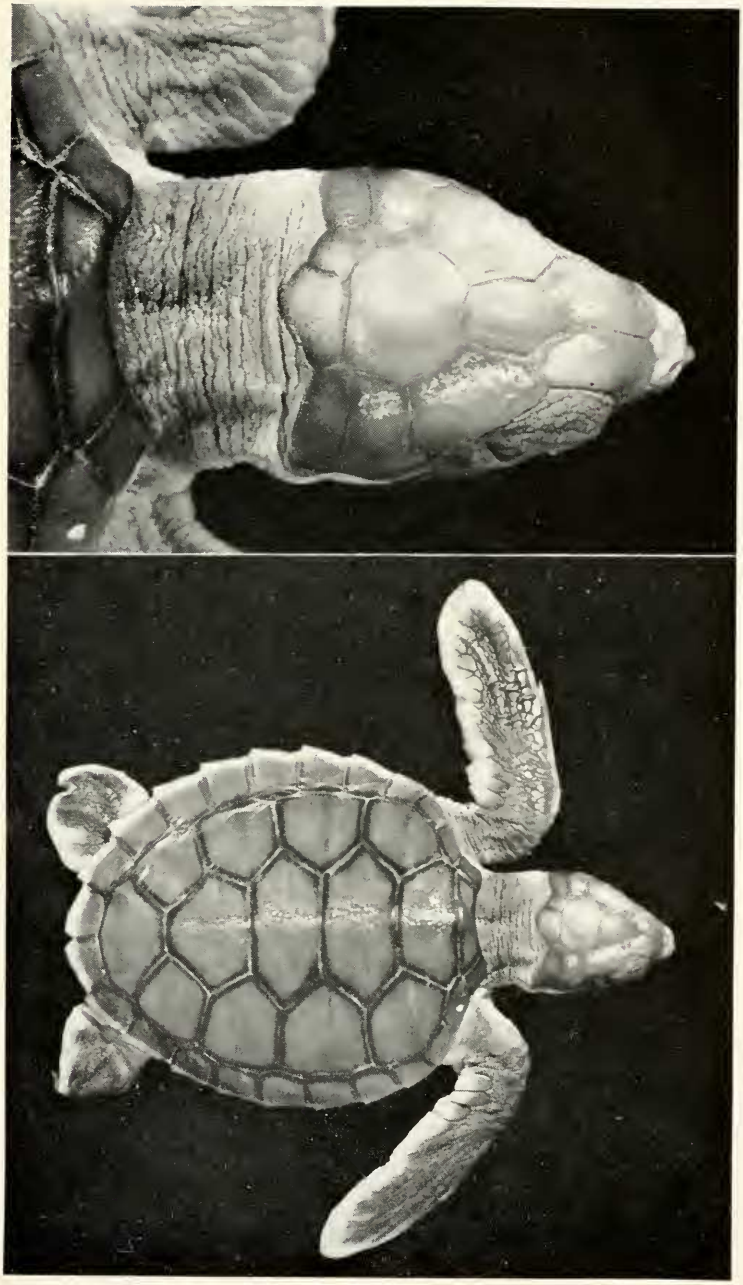

Plate 2. *Chelonia depressa*, the British Museum hatchling. *Top:* lateral view of head to show three postoculars and small number of subtemporal scales. *Bottom:* ventral view of body to show single brachial scale and weakness of scalation on forelimbs.